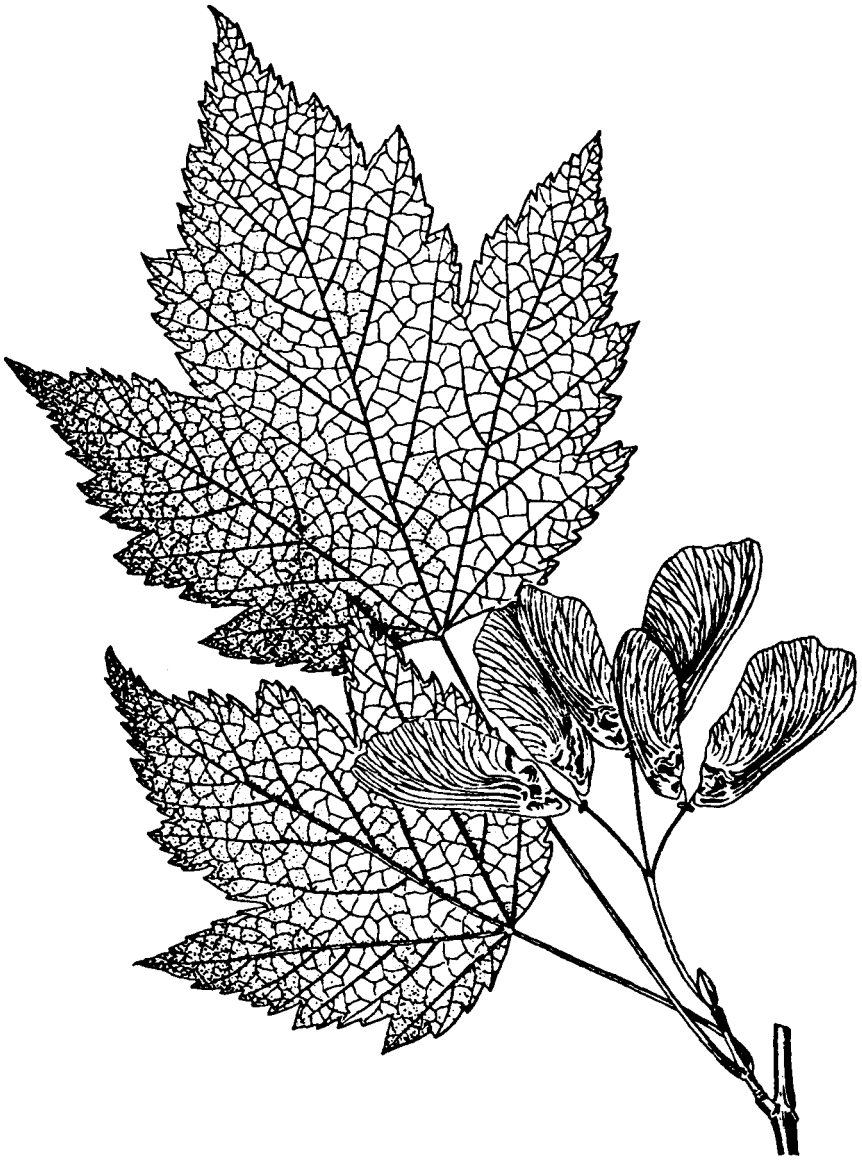
FOREST PEST CONDITIONS IN CALIFORNIA - 1994



A Publication of the California Forest Pest Council

THE CALIFORNIA FOREST PEST COUNCIL

The California Forest Pest Council (formerly the California Forest Pest Control Action Council) was established in 1951. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, disease, insects, and weeds. The Council's objective is to establish, maintain, and improve communication among individuals -- managers, administrators, and researchers -- who are concerned with these issues. This objective is accomplished by four actions:

1. **Coordination of detection, reporting, and compilation of pest damage information.**

2. **Evaluation of pest conditions.**

3. **Pest control recommendations made to forest management agencies and landowners.**

4. **Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.**

The California Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report, FOREST PEST CONDITIONS IN CALIFORNIA - 1994, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by four sources: (1) the state-wide Cooperative Pest Survey, in which federal, state, and private foresters and land managers participate, (2) information generated by Forest Pest Management, Pacific Southwest Region, USDA-Forest Service, while making formal detection surveys and biological evaluations, (3) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection, and (4) surveys and detections of the California Department of Food and Agriculture.

This report was prepared, published and distributed by the California Department of Forestry and Fire Protection with the cooperation of the Council's Standing Committees.

Allen Robertson, Editor-in-Chief

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EXECUTIVE SUMMARY

Bark beetles. Bark beetle caused tree mortality continued from the Inyo National Forest and Lake Tahoe northward through the east side of the northern Sierra Nevada and the southern Cascade Mountains. The fir engraver beetle on true firs and Jeffrey pine beetle on Jeffrey pine accounted for much of the mortality. True fir mortality was often in excess of 30-50% of the stand in specific areas. Mortality of ponderosa pine from attacks by western pine beetle occurred from northern Lassen County westward to the Sacramento River. Mountain pine beetle continued to kill sugar pine throughout northern California. Mortality along the western side of the Sierra Nevada continued to decline, particularly in the south.

Defoliators. Populations of defoliators continued at low or endemic levels. Trap catches of Douglas-fir tussock moth remained low and defoliation was not observed. The recent outbreak of white fir sawfly declined to minor defoliation in a small portion of Lassen County. Light, localized infestations of black pineleaf scale remain in portions of Siskiyou, Shasta, and Lassen Counties.

Drought. Moisture stress continued to be a primary cause of tree mortality throughout northern California. In most areas, levels of tree mortality were elevated, with all species affected to some extent. Sugar pine mortality levels were high throughout their range. Western white pines along the Smith River (Del Norte County) also experienced high levels of mortality. White fir mortality was especially severe in the eastside pine and mixed-conifer sites of northeastern California. These trees were attacked by insects in the summer and fall of 1993. Jeffrey and ponderosa pine mortality also increased in 1994. The Modoc, Lassen (Eagle Lake and Hat Creek Ranger Districts), and the northern districts of the Plumas National Forests experienced the highest levels of pine mortality .

Pitch canker. Pitch canker, was detected in all three of California's native Monterey pine stands. Infections on Bishop pine in southern Mendocino County were also reported. In coastal Santa Cruz County, ornamental plantings of Douglas-fir are infected but the disease has not spread into a neighboring native Douglas-fir stand.

Mistletoes. Dwarf mistletoes infest 2.2 million acres of National Forest lands in California. Their effects on trees have intensified due to continued drought stress.

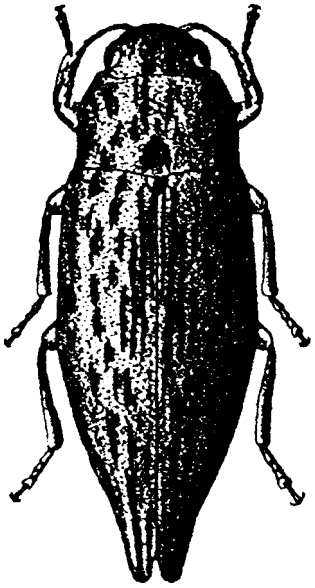
Root diseases. Trees continued to be predisposed to bark beetle attack by a variety of root diseases including black stain and annosus root disease. Long-term loss of site productivity is one of the most serious consequences of these pathogens.

White Pine Blister Rust. In general, levels of blister rust were very low on Ribes species throughout northern California because of the dry conditions during the summer. Infections on sugar pine from previous years are widespread throughout the mixed-conifer forest.

Animal Damage. A variety of mammal species have caused damage to forest trees. The damage varies by region of the state and by land ownership. All of California's major timber producing regions and timber types have reported damage by vertebrate species. Species most commonly identified as causing problems were deer, pocket gopher, domestic stock, rabbits and hares, porcupine, woodrat and black bear.

STATUS AND CONTROL OF INSECTS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE INSECT COMMITTEE



BRUCE ROETTGERING, CHAIR

LAURA MERRILL, SECRETARY

STATUS AND CONTROL OF INSECTS

WESTERN PINE BEETLE, *Dendroctonus brevicomis*

North Coast. The western pine beetle killed more than 100 trees in the combined areas of Middletown, Cobb Valley, High Valley, Lock Lomond, and Lake Pillsbury in Lake County. Nearly fifty trees were killed near Mendocino Pass east of Covelo and north of Redwood Valley, Mendocino County.

Northern. Ponderosa pine infested with overwintering broods of western pine beetle began to fade quite early in the spring of 1994. Drought, competition, dwarf mistletoe, and root disease contributed to tree mortality. Several general trends became apparent. Ponderosa pine mortality was high, including some areas which rarely show much mortality, such as the Sacramento River Canyon from Lakehead to Dunsmuir. Ponderosa pine mortality increased from west to east across northern California, and in northeastern California was most evident in the old, pre-dominant, overstory trees, along with some small groups of large pole and small sawtimber-size trees.

More specifically, western pine beetle activity in ponderosa pine increased this year on drier sites. In Siskiyou County, active infestations of the western pine beetle were noted near the community of Horse Creek, on Soap Creek Ridge, and in mature trees in the Yreka cemetery. In Trinity County, infestations were noted in the vicinity of Lewiston and on Mikes Peak. In Shasta County, western pine beetle activity remains high from Burney eastward. Ponderosa pines in both Burney Falls and Castle Crags State Parks, Shasta County, were killed by the beetle. A lowered water table due to drought was the probable cause for trees dying on coarse, well-drained soils bordering Castle Creek. North of Thomes Creek in Tehama County, western pine and red turpentine beetles continued to attack ponderosa pine on the dry south-facing slope of the drainage. Ongoing tree mortality has been noted in this area since its detection by aerial survey in 1987.

Low levels of western pine beetle related mortality in ponderosa pine were reported from the north central part of the Plumas National Forest, and the east side of the Tahoe National Forest. In northern Lassen County, groups of ponderosa pine killed by the western pine beetle are scattered across thousands of acres south of State Highway 299 on Big Valley Mountain. Also in Lassen County, numerous groups of dead ponderosa pine are apparent along State Highway 36 between Westwood and Fredonyer Pass, and some ponderosa pine mortality was observed in the Blacks Mountain Experimental Forest. Western pine beetle is continuing to cause mortality of mid- to larger-diameter ponderosa pines along Highway 44 on the Hat Creek and Eagle Lake Ranger Districts of the Lassen National Forest.

Sierra. Pine mortality associated with western pine beetle activity continued to decline relative to the high drought-related levels experienced between 1989-1992 in most westside pine and mixed-conifer areas in the southern Sierra Nevada.

PINE ENGRAVER BEETLES, *Ips* spp.

North Coast. Pine engravers attacked 36 ponderosa pine north of Redwood Valley, and six ponderosa pine near Spy Rock, Mendocino County. Forty Monterey pines were killed in Redwood Valley, and 24 were killed south of Ukiah, Mendocino County. In Lake County, 25 ponderosa pine were attacked near Loch Lomond and 16 ponderosa pine were attacked in Cobb Valley.

Northern. Some of the areas which had widespread snow breakage during the spring of 1993 had ponderosa pine tops fading during the spring of 1994. Top-killing of groups of ponderosa pine on McCloud Flats, Siskiyou County, was caused by the California five-spined ips, *Ips paraconfusus*. Top-killing and sapling mortality had been anticipated in these same areas during the summer and fall of 1993 and their absence was specifically noted last year. In general, engraver beetles were found in pines that were under attack by other bark beetles.

Sierra. Exceptional pine engraver activity was not reported from the westside southern Sierra Nevada. Increasing pinyon pine mortality was observed on the eastside of the Sierra Nevada between Minden/Gardnerville (Douglas County, NV) and June Lake (Mono County), and probably was associated with pinyon ips (*I. confusus*) activity.

FIR ENGRAVER, *Scolytus ventralis*.

North Coast. This engraver killed or degraded ten large grand fir near the mouth of the Navarro River, Mendocino County. Many of the attacked trees were infected with Armillaria root disease.

Northern. The subjective opinion expressed by some observers of white fir mortality in northern California is that the number of white fir trees which faded in 1994 might have been slightly lower than 1993, but estimates of mortality volumes do not substantiate this opinion (Table 1). Continued high levels of mortality were evident throughout the true fir component from the Tahoe National Forest north to the Modoc National Forest. East of the Sierra Crest, the Tahoe National Forest continued to have large amounts of true fir mortality. Due to the relatively dry winter of 1993-1994, additional white firs were attacked this year on the east side of the Plumas National Forest. Fir engraver in white fir and Jeffrey pine beetle in Jeffrey pine have contributed to a dramatic increase in mortality over the past three years in the upper Boulder Creek watershed and along the extreme eastern escarpment between Antelope Lake and Frenchman Lake on the Plumas and Lassen County border. In some areas, portions of entire drainages are completely dead. The east side of the Plumas National Forest has 60,000 acres of true fir under contract, but due to market conditions only 10 to 15% of these acres may be logged.

Specific areas of true fir mortality, often in excess of 50% of the stand, on the Lassen National Forest and on the Susanville District of the Bureau of Land Management include Fredonyer Pass, Pegleg Mountain, Antelope Mountain, and the Thousand Lakes Wilderness. High levels of fir mortality were also reported from several areas in Modoc County. Approximately 42,000 acres of the Warner Mountain Ranger District, Modoc National Forest, have extremely high levels of white fir mortality. Other locations include the numerous north-south ridges around Adin in Modoc and Lassen Counties. Mortality has ceased on some of the sites which had high white fir mortality over the past couple of years. Some stands have been reduced to only a few non-host, and a few residual white fir trees per acre. For example, on Jimmerson Mountain, Modoc County, the number of white fir have been so drastically reduced through the course of the drought that few trees remain to be killed.

Table 1. Mortality from Bark Beetles within the National Forest System, California - 1994[a]

	Pine[b]		True Fir	
Locale	Acres of Mortality	MMBF	Acres of Mortality	MMBF
Northern California	230,700	342.7	174,100[c]	299.9
Cascade/ No. Sierra	65,800	114.3	383,300	493.1
Central/ So. Sierra	85,100	201.4	35,100	82.7
Southern California	143,400	60.0	84,900	20.7
Total	525,000	718.4	677,400	896.4

a. Mortality is seldom from bark beetles alone as other factors (eg. drought) and agents (eg. root diseases) predispose trees to successful attack.

b. Includes ponderosa, Jeffrey, sugar, and lodgepole pines.

c. Includes Douglas-fir.

Tables 1 and 1A give a comparison of estimated losses over the past two years. Table 1A was included because a formatting and computation error gave an incorrect picture of losses in 1993 as shown in the "1993 Forest Pest Conditions in California." Therefore, Table 1A supersedes Table 1 in the 1993 report.

Sierra. True fir mortality and top-kill associated with the fir engraver continued at low levels throughout most of the westside southern Sierra Nevada. However, parts of the Lake Tahoe Basin and the eastern Sierra between Mammoth Lakes and Lee Vining (Mono County) had relatively high levels of red and white fir mortality.

RED TURPENTINE BEETLE, *Dendroctonus valens.*

North Coast. This bark beetle infested ponderosa pine attacked by pine engravers and/or western pine beetles. Over 60 Monterey pines located south of Ukiah and in Redwood Valley, Mendocino County, were infested with red turpentine beetle and eventually killed by pine engraver beetles.

Northern. Fresh activity as a result of red turpentine beetle attacks was very prevalent in north central California. Very dry conditions in locations such as McCloud Flats, Siskiyou County, resulted in all species of pine bark beetles producing only dry, red frass. It was difficult to determine from external symptoms whether basal attacks were being caused by red turpentine beetle, western pine beetle, or mountain pine beetle. Red turpentine beetle adults were abundant enough to

cause immediate attacks on surviving pines in two late September fires near Clair Engle Lake, Trinity County.

Attacks by this bark beetle were often found in conjunction with western pine beetle, mountain pine beetle and Jeffrey pine beetle in northeastern California. Mortality directly related to this insect seems to have subsided in 1994.

Sierra. Very high levels of red turpentine beetle activity in large (35 to 55+ inch dbh) sugar pine occurred on the Pacific Ranger District (El Dorado County). The attacked trees suffered varying levels of fire injury in 1992 during the Cleveland wildfire. Many of the attacked sugar pine have died, and others are expected to die, from the number and extent of red turpentine beetle attacks in the lower third of the bole.

Southern California. Pine mortality, mostly Coulter pine, was reported from the Henniger Flats nursery (Los Angeles County). The trees were damaged during the Kinneloa Fire in October 1993 and were subsequently attacked by red turpentine beetles and pine engravers. Dead and infested trees were salvaged and the stumps treated with borax for prevention of infection by the fungus causing annosus root disease.

Table 1A. Mortality from Bark Beetles within the National Forest System, California - 1993[a]

	Pine[b]		True Fir	
Locale	Acres of Mortality	MMBF	Acres of Mortality	MMBF
Northern California	84,800	278.1	96,510[c]	290.5
Cascade/ No. Sierra	34,300	172.1	179,950	406.6[d]
Central/ So. Sierra	163,600	305.5	111,950	171.1
Southern California	62,800	64.2	16,590	11.7
Total	345,500	864.9	405,000	879.9

a. Table 1A supersedes Table 1 in the 1993 report.

b. Includes ponderosa, Jeffrey, sugar, and lodgepole pines.

c. Includes Douglas-fir.

d. TF figure includes volumes from 1992 as well as 1993.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae.*

North Coast. Activity was rather limited in coastal areas. Mortality of two ponderosa pine in Redwood Valley, Mendocino County, and two ponderosa pine above Lake Pillsbury, Lake County, was reported, along with the death of five sugar pine along Signal Ridge in Mendocino County.

Northern. Sugar pine mortality caused by drought and mountain pine beetle has continued or increased across northern California. Additional large, overstory trees were killed as in previous years, but there was also mortality in the relatively thrifty 20 to 80 year age class. Scattered mortality continued throughout the host range on the Plumas and Lassen National Forests and in Lassen National Park. Notable increases were reported in the vicinity of the Middle and South Forks of the Feather River east of Lake Oroville, Plumas and Butte Counties, in the Big Valley Mountains, Modoc and Lassen Counties, and near Pondosa, Siskiyou County.

Lodgepole pine mortality has stabilized in some stands because such a high percentage of the stems have already been killed by mountain pine beetle. However, mortality in lodgepole pine remains common on the Lassen National Forest in the small diameter size class. A significant proportion of the lodgepole pine around Little Crater Lake in Lassen County, including the campground, faded during 1994. Lodgepole pine mortality continued between Butte and Snag Lakes in Lassen National Park. Mountain pine beetle was responsible for killing small groups of sapling to pole-size, drought-stressed ponderosa pine in northeastern California.

Sierra. Mountain pine beetle activity was generally low throughout the Sierra Nevada. An exception was the Donner Memorial State Park where mortality of several thousand lodgepole pines occurred over the past two years. Continuing lodgepole pine mortality also was reported from locations in the Lake Tahoe Basin and the Lakes Basin area near Mammoth Lakes (Mono County), including Twin Lakes Campground.

Southern California. Activity of the mountain pine beetle in ponderosa and sugar pine was at low levels.

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae.*

North Coast. Several Douglas-firs were attacked in the Open Space District of San Mateo County along Highway 35. A combination of Douglas-fir beetle and flatheaded fir borer killed a very limited number of Douglas-fir northwest of Willits, Mendocino County.

Northern. Douglas-fir beetle has killed many of the largest Douglas-firs on the Forest Service Log Grading plots near Castle Lake in Siskiyou County. In addition to stress from extended drought, most of these trees had severe dwarf mistletoe infections. Douglas-fir beetle was purposely induced into attacking selected Douglas-fir trees in a test conducted in Siskiyou County in an area between Sawyers Bar and Cecilville. Two pheromone blends were compared in their ability to cause Douglas-fir beetle to fatally attack old dwarf mistletoe-infected residual Douglas-firs left standing over young plantations. A three-component commercially available "trap bait" worked well.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi.*

Northern. Mortality caused by Jeffrey pine beetle attacks on drought-stressed trees has been increasing for several years over much of northern California as far south as the eastside of the Tahoe National Forest. Specific locations of current Jeffrey pine beetle attacks include several areas within Lassen Volcanic National Park in Shasta and Lassen Counties: along Highway 89 between the Devastated Area and Manzanita Lake, along the Pacific Crest Trail between the Twin Lakes and Badger Mountain, and around the east and south sides of Butte Lake. Numerous spots occur on the Lassen National Forest in Shasta County: along Highway 89 from the north entrance of Lassen Volcanic National Park to the Vista Point, and along the trail from the Tamarack Swale trailhead to Eiler Lake in the Thousand Lakes Wilderness. Groups of dead and dying Jeffrey pine were seen from State Highways 36, 44, and 139 in Lassen County. Mortality of large overstory Jeffrey pine was high in the upper Boulder Creek watershed in the northeast corner of Plumas County. However, mortality in Lassen County in the area bound by Lost Spring, Pole Spring, Duck Lake and Butte Creek (Eagle Lake Ranger District) continued at levels much lower than reported in 1993.

Sierra. Mortality associated with the Jeffrey pine beetle continued at high levels in the Lake Tahoe Basin and the Inyo National Forest. Particularly high concentrations of mortality were evident in the Spooner Summit and Glenbrook areas on the east shore of Lake Tahoe and around the Inyo Craters and Deadman Summit areas on the Mammoth Ranger District (Mono County).

ROUNDHEADED FIR BORER, *Tetropium abietis.*

Northern. Roundheaded fir borer was a common associate in true fir killed by the fir engraver beetle in most areas of northeastern California. Although it can readily be found in the bases of many trees, it is secondary in attack and trees killed by roundheads only were rare.

FLATHEADED FIR BORER, *Melanophila drummondi.*

North Coast. More than 20 Douglas-firs were attacked northwest of Willits, Mendocino County. A few of these trees had black stain root disease. In Lake County, 25 Douglas-firs were killed near Middletown and in Cobb Valley.

Northern. Many residual Douglas-firs in the area of the old Haystack burn (Klamath National Forest) in the Humbug Creek drainage have numerous clear pitch streamers on the bole. Checked trees displaying these symptoms had fairly mature larvae of the flatheaded fir borer in their cambial layer.

Attacks by the fir flatheaded borer were the apparent cause of recent Douglas-fir mortality near the community of Horse Creek, Siskiyou County. Some stands of fir accumulated mortality in excess of 50% during the recent years of drought. Surrounding vegetation and growth characteristics of the trees suggests that these Douglas-firs have suffered chronic moisture stress. On Soap Creek Ridge, Siskiyou County, numerous Douglas-fir with poor crown characteristics exhibited evidence of attack by the borer, but no trees have died recently.

CALIFORNIA FLATHEADED BORER, *Melanophila californica.*

Northern. This borer was common in trees that had already been killed by either mountain pine beetle or western pine beetle. There were no reports of woodborer activity alone causing mortality to pines.

DOUGLAS-FIR ENGRAVER, *Scolytus unispinosus.*

North Coast. The Douglas-fir engraver attacked ten Douglas-firs in Willits that were infected with black

stain root disease, and one Armillaria-infected tree in Brooktrails, Mendocino County. Two mite-infested Douglas-firs were attacked in Lakeport, Lake County, and three trees were attacked near Middletown, Lake County. The latter trees did not have any predisposing condition.

GYPSY MOTH, *Lymantria dispar.*

California. Over 20,700 gypsy moth traps were deployed and monitored as part of California's program to detect and delimit Asian or North American gypsy moth infestations. A total of 10 gypsy moths were trapped in nine counties in 1994 compared to 12 trapped in seven counties in 1993 (Table 2).

Table 2. Gypsy Moth Finds in California - 1994

CITY	ADULTS	DATE
Anaheim	1	07/19/94
Angwin	1	07/19/94
Berkeley	1	07/06/94
Cottonwood	1	07/21/94
Encino	1	08/09/94
Fair Oaks	1	07/20/94
Grass Valley	1	08/02/94
Los Altos Hills	1	08/15/94
Monte Serrano	1	08/04/94
Santa Rosa	1	08/15/94
TOTAL	10	

Each location was investigated for possible association with "move-ins" from the gypsy moth infested area of the Northeastern United States. These investigations did not verify this association. Visual surveys were conducted on all ten properties and no additional life stages were detected. These ten areas will be intensively trapped at 25 traps per square mile, in a four-square-mile area surrounding the find location, during the 1995 season.

All specimens were analyzed for possible Asian gypsy moth identification. The Fair Oaks, Los Altos Hills, and Santa Rosa specimens were identified positive as Asian gypsy moth. The normal four-square-mile intensive trapping area around these finds will be maintained in 1995. This action is based on the uncertainty of the mitochondrial DNA testing and the distance of 10 to 40 miles from the nearest marine port to these finds.

Oregon. [1] Seventy-eight moths were detected in 1993 at ten sites and three eradication projects were completed in the spring of 1994. "The largest was a 270 net acre aerial spray near Carver, Clackamas County. Three applications were made at this site by helicopter in May. Ground sprays were carried out at two smaller sites in Greater Portland: 1.25 acres at Palatine Hill (Multnomah County) and 7 acres in Lake Grove, Clackamas County (Table 3). The biological insecticide B.t. was used at all sites."

"Early detection of new introductions continues to be the main focus of the Oregon Department of Agriculture's detection program in order to keep eradication programs as small as possible. Approximately 14,000 gypsy moth traps were placed statewide in 1994. Thirty-nine moths were found by October 30, 1994 at four new and three old sites, all in western Oregon (Table 3). Twenty-five moths came from an old site in Lane County where eight moths were caught in 1993, but no eradication treatments were made. Single catches were made near two of the three 1993 eradication sites." DNA testing indicated that none of the 39 moths were of the Asian strain.

"Twelve detections in 1994 were likely the result of new introductions and not related to previous finds. Literature distribution, information gathering regarding recent move-ins from the northeastern U.S., and egg mass searching were successful at both the Jacksonville and Veneta sites. A move-in from Maine was identified in Jacksonville and a travel trailer which visited infested states was identified in Veneta. Eradication programs will be proposed for these two sites in 1995. The biological insecticide B.t. applied by ground or air has been used successfully in all eradication programs since 1984. Other experimental eradication techniques such as sterile insect release or application of NPV gypsy moth virus may be considered for use in 1995."

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata.*

Northern and Sierra. Retrieval of 1994 early warning, pheromone traps was limited by early winter storms. Data that was collected does not indicate any significant

1 Mudge, A.D., D.J. Hilburn, and Kathleen J.R. Johnson. 1994. Gypsy moth detection, eradication, and quarantine programs in Oregon. Oregon Dept. Agr., Plant Div., Salem, OR 97310-0110. Presented at the Annual Gypsy Moth Review, Oct. 30 - Nov. 2, 1994, Portland, OR.

Table 3. 1994 Gypsy Moth Detections in Oregon

County	Area	Site Status	No. GMs	Trap Density	Density Status
Clackamas	Carver[1]	Old	1	16/ sq mi	(Increased)
	Lake Grove[2]	Old	1	49/ sq mi	(Increased)
	Mt. Scott	New	1	2-4/ sq mi	
Coos	Coos Bay	New	1	4/ sq mi	
Jackson	Jacksonville	New	7	2/ sq mi	(Increased)
Lane	Veneta	Old	25	49/ sq mi	(Increased)
Marion	Salem	New	1	2/ sq mi	(Increased)
Multnoma	East Portland	New	2	2/ sq mi	(Increased)
			Total 39		

1. 1994 eradication site, aerial application B.t.
2. 1994 eradication site, ground application B.t.

activity by the Douglas-fir tussock moth in California for 1995. A complete summary of the 1994 results will be provided in the 1995 report.

LODGEPOLE NEEDLEMINER, *Coleotechnites milleri*

Sierra. The annual survey in Yosemite Park, May 23 to June 3, found population densities at low levels that did not cause visible defoliation at all but two plots. Very high larval populations were found at May Lake and Olmstead #1. Needleminer population densities in both of these areas far exceeded the numbers that can be supported by the foliage available on the trees. Heavy to complete defoliation was anticipated at these two plots by September 1994 with the result that most of the larvae present will fail to reach maturity in 1995. This was the second time in the past four years that these trees were defoliated. However, little or no mortality was anticipated. Needleminer survival at these two plots may be low enough to end the outbreaks at these sites.

The heavily used areas around Tenaya Lake and Tuolumne Meadows continued to be free of visible defoliation. However, the extensive areas of defoliation in several back country locations reported in 1993 were again visible and two areas of defoliation were visible along Highway 120 west of Tenaya Lake.

A total of eight larvae of the generation that matures in even numbered years was found at seven sites. This provides continuing confirmation of the existence of an alternate year needleminer population at a density slightly below the detection limit of the sampling system. (Appreciation is extended to Dr. Tom Koerber, Entomological Services Co., Berkeley, for this information.)

MODOC BUDWORM, *Choristoneura retiniana.*

Northern. Little or no conspicuous defoliation was noted in the Warner Mountains in California this year. Light defoliation could have been overlooked because of extensive faded foliage from white fir mortality. In the Oregon portion of the Warner Mountains (Fremont National Forest), light defoliation was detected on the west-facing slope north of Lakeview, Oregon.

A CALIFORNIA SPRUCE BUDWORM, *Choristoneura carnana californica.*

Northern. Defoliation was not observed.

FALL WEBWORM, *Hyphantria cunea.*

Northern. Webs were abundant on black walnut in riparian areas along the Sacramento River in Tehama County.

WHITE FIR SAWFLY, *Neodiprion* nr. *deleoni* and *abietis*

Northern. The outbreak of the white fir sawfly between Eagle Lake and Lake Almanor, Lassen and Plumas Counties, is essentially over, although residual populations of the sawfly caused minor defoliation north of McCoy and Hog Flats. Light defoliation was reported from the Cornaz Peak area, west of State Highway 89, Shasta County.

A PINE SAWFLY, *Neodiprion* nr. *fulviceps*.

Northern. No conspicuous defoliation was noted in 1994.

TENT CATERPILLAR, *Malacosoma* sp.

Sierra. Light-to-moderate defoliation of antelope bitterbrush was observed over 1500 to 3000 acres on the Truckee Ranger District (Nevada County) in the vicinity of Hobart Mills and Stampede Reservoir.

BLACK PINELEAF SCALE, *Nuculaspis californica*.

Northern. A localized infestation of the black pineleaf scale affected ponderosa pines near Weed, Siskiyou County. Droughty site conditions and dust from an adjacent mill's log sorting area appear to be contributing to the infestation. In the Burney Basin, Shasta County, black pineleaf scale populations have declined, but are still elevated on some trees, particularly along Black Ranch Road. Light infestations of the scale were reported on ponderosa pine in the Pine Creek Valley west of Logan Mountain, Lassen County, and in the vicinity of Cornaz Peak west of State Highway 89, Shasta County.

A TWIG BEETLE, *Pityophothorus setosus*

North Coast. This Monterey pine twig beetle killed lower crown branches of a few hundred Monterey pines in the Del Monte Forest of Pebble Beach, Monterey County.

WEEVILS, *Pissodes* sp.

North Coast. Weevils of this genus mined and killed terminals of Monterey pine saplings in southern coastal Mendocino County and northern coastal Sonoma County.

GOUTY PITCH MIDGE, *Cecidomyia piniinopsis*.

Northern. Levels of branch tip flagging appeared low this year.

DOUGLAS-FIR TWIG WEEVIL, *Cylindrocopturus furnissi*.

North Coast. This tiny weevil caused twig mortality in several hundred Douglas-fir Christmas trees in Yorkville, Mendocino County.

PINE REPRODUCTION WEEVIL, *Cylindrocopturus eatoni*.

Northern. Young ponderosa pine in a plantation near Whitmore, Shasta County, were damaged and killed by the pine reproduction weevil.

Sierra. Scattered mortality of ponderosa pine reproduction that was caused by the pine reproduction weevil was noted in a few plantations on the Groveland Ranger District in Tuolumne County.

AMBROSIA BEETLE, *Platypus wilsoni*.

Sierra. No new activity was reported. Several of the fire-injured white fir attacked in 1993 by Platypus died in 1994.

DOUGLAS-FIR NEEDLE MIDGES, *Contarinia* spp.

North Coast. Douglas-fir needle midges infested Douglas-fir Christmas trees in farms in Santa Clara and Santa Cruz Counties. An infestation also was found in a natural stand of Douglas-fir along Pine Ridge west of Ukiah in Mendocino County.

WESTERN PINESHOOT BORER, *Eucosma sonomana*.

Northern. An ongoing infestation of the western pine shoot borer is causing reduced height growth of young ponderosa pine in plantations covering the Pondosa Burn east of Pondosa, Siskiyou County. Many thousands of acres are affected. A survey conducted late in 1993 showed 20 to 40% of terminals were infested. Similar levels of infestation were noted in 1994.

PINE NEEDLE SHEATHMINER, *Zelleria haimbachi.*

Northern. An outbreak of the pine needle sheathminer expanded in pine plantations covering the Pondosa Burn east of Pondosa, Siskiyou County. Both ponderosa and Jeffrey pines are affected. Although the general area of infestation is estimated at more than a thousand acres, heavy defoliation is restricted to several hundred acres on the east side of the burn. Only a small number of trees on the east side of the burn exhibited damage from the sheathminer in 1993.

FRUITTREE LEAFROLLER, *Archips argyrospilus.*

Populations on black oaks in the San Bernardino Mountains appeared to be declining compared to 1993. However, visible light to moderate defoliation of black oak occurred on 80 acres in the Mendenhall Valley on Mt. Palomar (San Diego County), and it appears that this population may be on the increase. These black oaks refoliated by mid-July.

CALIFORNIA OAKWORM, *Phryganidia californica*

Southern California. Light defoliation occurred to coast live oak on Mt. Palomar (San Diego County).

A GELECHIID LEAF SKELETONIZER, *Chionodes trichostola.*

Sierra. Damage to blue oak was recorded on a Forest Health Monitoring reference plot in El Dorado County.

ALDER FLEA BEETLE, *Altica ambiens.*

Southern California. In riparian zones of the San Bernardino and San Gabriel Mountains, there were reports of alder defoliation that appear to be caused by alder flea beetle. In Mill Creek Canyon, San Bernardino County, a few hundred alders were affected with almost 100 killed. Cause of mortality was suspected to be repeated defoliation combined with roundheaded borer attack.

CONIFER APHIDS, *Cinara* spp.

Northern. There were no recorded observations of Cinara aphids in northern California during 1994.

A WALKING STICK, *Timema* nr. *californicum.*

North Coast. This walking stick caused defoliation and twig girdling of Douglas-fir in a thirty to forty acre stand along Rainbow Ridge in Humboldt County. Similar damage occurred in a narrow one-mile stretch of Pine Ridge west of Ukiah, Mendocino County. The first and last report of defoliation by this insect was in 1980.

BLUEGUM PSYLLID, *Ctenarytaina eucalypti.*

Northern. With a recent find in Eureka, Humboldt County, the insect now occurs in all coastal California counties except Del Norte (Cal. Plant Pest & Disease Report, 13(3-4):65. 1994.)

Infestations on *Eucalpytus pulverulenta* (baby blue eucalyptus) were significantly lower this year in areas where the primary parasitoid wasp, *Psyllaephagus pilosus* Noyes (Encyrtidae) was introduced in 1993 (8 sites in the counties of San Diego, San Luis Obispo, Monterey, Alameda, and Sonoma). Psyllid levels at these sites in 1994 were well below levels achieved previously with spray treatments, and did not cause economic damage. The psyllid was still a problem in areas about 20 miles from the 1993 releases in Monterey County, but the parasitoid began arriving at this site in large numbers by mid-summer of 1994. The parasitoid appears to be spreading rapidly to other California counties.

On *Eucalyptus globulus* (blue gum) the spring psyllid populations at two sites near the 1993 parasitoid releases were also significantly lower than in 1993, and the parasitoid was abundant. (Appreciation is extended to Prof. Don Dahlsten, Div. of Biological Control, U. of California, for this information.)

A GUM-TREE WEEVIL, *Gonipterus scutellatus*

Southern. This Australian native was discovered for the first time in North America in Ventura County on March 14, 1994. The weevil is a severe pest of eucalyptus in its native Australia, and it often causes severe injury to eucalyptus in areas where it is introduced.

Larvae feed as miners for a time, then exit to feed on the leaf surface as a skeletonizer. Older larvae chew down the leaf edges to produce the most noticeable injury, edge-notching.

While the damage can be severe, the importation of an egg parasite has brought effective control to most countries where introduction has occurred. The parasite is the Mymarid wasp, *Anaphoidea nitens* (Calif. Dept. Food & Agr. 1994. Calif. Plant Pest & Disease Rept. 13(1-2):4-7).

AFRICANIZED HONEY BEE, *Apis mellifera scutellata*

Southern. The Africanized honey bee made its official entry into the State of California on October 24, 1994. A naturally migrating swarm (versus a human-assisted swarm) was found and killed at the Chuckwalla State Prison 20 miles west of Blythe. Bee movement unexpectedly slowed in 1994, presumably because of the lack of forage in the Colorado Desert, where rainfall was light last season, because of parasitism by the Varroa mite, and because of competition from managed hives and desert-adapted European bees. No swarms have been found in forested areas of the state thus far.

Table 4. Insects of Lesser Importance in California - 1994

Insects		Where Examined or Reported		
Scientific Name	Common Name	Host	County	Remarks
Adelges cooleyi	Cooley spruce gall aphid	DF	Santa Clara, Santa Cruz	In Christmas tree farms
Agrilus burkei	A flatheaded borer	AL	Siskiyou	Associated with tree mortality following the 1991 Cantara Spill.
Alniphagus aspericollis	Alder bark beetle	AL	Siskiyou	same as above
Blastopsylla occidentalis	Eucalyptus psyllid*		Sacramento	It was found for the first time in this county.
Chionaspis pinifoliae	Pine needle scale	Pine	Mendocino	A heavily infested ornamental in Willits was killed by pine sawyers.
Cryptorhynchus lapathi	Poplar-and-willow borer	PT	Siskiyou	Associated with tree mortality following the 1991 Cantara Spill.
Dioryctria sp.	Coneworm	FP	Siskiyou	Boring in blister rust canker near Lake Mountain Lookout.
		PP	Butte	Cone and bud damage at the Chico Genetic Res. Center.
		CP	Orange	At least two species may be new host associations.
Epinotia emarginana	An olethreutine tortricid moth	BO & QD	Shasta	Spring defoliation occurred in the upper Sacramento Valley.
Ergates spiculatus	Ponderous borer	PP?, LPP?	eastern Shasta	Adult flying near pine snow breakage in late July.
Halisidota argentata	Silverspotted tiger moth	BP	Mendocino	Damaged several pines near Ft. Bragg.
Lambdina fiscellaria somniaria	Western Oak Looper	QG	Siskiyou	Thousands of acres of oak defoliated in brush fields NW of Yreka.
Leptoglossus occidentalis	Western conifer seed bug	PP	Butte	Present in plantations at the Chico Genetics Resource Center.
Matsucoccus bisetosus	twig scale	PP	Siskiyou	Caused branch flagging near Cecilville.
Phloeosinus sp.	a cedar bark beetle	LC	Mendocino	A few Leyland cypress in Ukiah had flagging and top-kill from attacks.
Phylloxera sp.	Oak phylloxera*	OA	Fresno,Yuba, San Diego, San Mateo, Yolo	Populations were heavy on native oaks this year.
Pseudohylesinus nebulosus	Douglas-fir pole beetle	DF	Mendocino, Santa Cruz	Several trees with black stain root disease were attacked near Willits. Three suppressed trees near Aptos (Santa Cruz Co.) were attacked.

Table 4. Insects of Lesser Importance in California - 1994 (continued)

Insects		Where Examined or Reported		
Scientific Name	Common Name	Host	County	Remarks
Pseudohylesinus sericeus	Silver fir beetle	DF	Santa Cruz	Associated with *P. nebulosus* at Aptos.
Pseudopityophthorus agrifoliae	An oak bark beetle	QA	Mendocino	It killed five coast live oaks near Redwood Valley.
Puto profusus	Douglas-fir mealybug*	DF	Tulare	This is a new county record. Previous records are Trinity and Plumas Counties.
Rhyacionia zozana	Ponderosa pine tip moth	PP	Butte	Minor damage at the Chico Genetics Resource Center.
Scythropus sp.	a weevil	PP	Tehama	Seedlings and saplings near Lyman Springs and Plum Creek Roads and Hwy 36 East were damaged.
Stegophylla sp.	Woolly oak aphid*	OA	Butte, Santa Clara, Plumas,	Populations were heavy on native oaks this year.
Stenolechia bathrodyas	Juniper Gelechiid moth**	JU CY	Santa Barbara	A new county record for this moth introduced from Japan and first found in 1969.
Synanthedon sequoiae	Sequoia pitch moth	MP	Mendocino	Infested scores of Monterey pines.
Telphusa sedulitella	A gelechiid moth	BO	Shasta	Spring defoliation occurred in the upper Sacramento Valley.
Unknown	Eryophid bud mite	RW	Mendocino	Caused extensive bud swelling in two redwoods north of Ft. Bragg.
Unknown	Microlepidoptera	SY CW	Angeles	Defoliation occurred in the San Gabriel (SY) and San Bernardino (CW) Mountains.

* California Dept. Food and Agr. 1994. California Plant Pest and Disease Report. Vol. 13, Nos. 3-4.

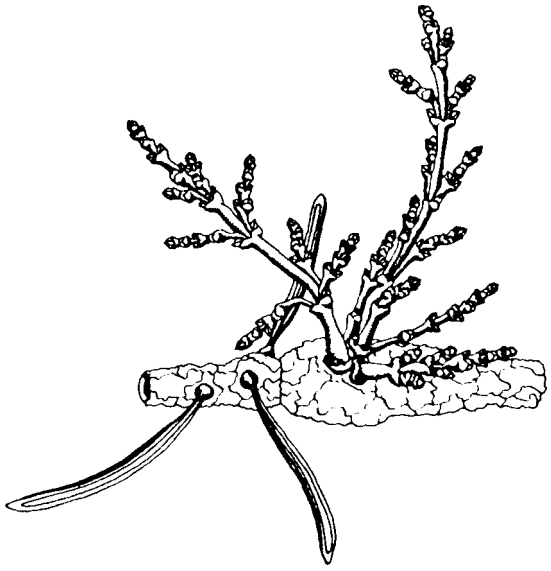
** California Dept. Food and Agr. 1994. California Plant Pest and Disease Report. Vol. 13, Nos. 1-2.

HOST ABBREVIATIONS

AL = Alder	BO = California black oak	BP = Bishop pine	CP = Coulter pine
CW = Cottonwood	CY = Cypress	DF = Douglas-fir	JU = Juniper
FP = Foxtail pine	LC = Leyland cypress	LPP = Lodgepole pine	MP = Monterey pine
OA = Oaks (Quercus spp.)	PP = Ponderosa pine	PT = Black cottonwood	QA = Coast like oak
QD = Blue oak	QG = Oregon white oak	RW = Redwood	SY = Sycamore

STATUS AND CONTROL OF DISEASE

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE DISEASE COMMITTEE



JESS RIOS, CHAIR

JOHN PRONOS, SECRETARY

STATUS AND CONTROL OF DISEASE

ABIOTIC DISEASES

Drought. Moisture stress continued to be a primary cause of tree mortality over northern California. In most areas, levels of tree mortality were elevated with all species being affected to some extent. Sugar pine mortality levels were high throughout northern California, and western white pines along the Smith River (Del Norte County) experienced high levels of mortality. White fir mortality was especially severe in the eastside pine and mixed-conifer sites of northeastern California. In most instances, these trees were attacked by insects in the summer and fall of 1993.

Jeffrey and ponderosa pine mortality also increased in 1994. The Modoc, Lassen (Eagle Lake and Hat Creek Ranger Districts), and the northern districts of the Plumas National Forests experienced the greatest amount of pine mortality (Modoc, Lassen and Plumas counties). Drought also contributed to death and topkill of hundreds of dry farmed Douglas-fir Christmas trees. The trees were 3 to 4 feet tall growing north of Middletown in Lake County.

Carbon Dioxide Toxicity. Mortality of lodgepole pine, red fir, western white pine, and mountain hemlock continued at Horseshoe Lake and nearby locations on the Mammoth Ranger District, Inyo National Forest (Mono County). The Horseshoe area has increased from 15 acres in 1992 to 28 acres in 1994. Almost all conifers within the site have been killed. Personnel from the U.S. Geological Survey are monitoring the site. Elevated soil levels of carbon dioxide appear responsible for the mortality.

Snow and Wind. Heavy snow and high winds on the Almanor Ranger District, Lassen National Forest, caused windthrow of primarily white fir and red fir over approximately 700 acres north of Humboldt Summit (Plumas County).

Freeze injury. Freeze damage was noted in juniper and Jeffrey pine just north of Sierraville (Sierra County). This is a common occurrence along the Southwest edge of the Sierra Valley because of frequent winter inversions and cold pockets.

Nutrient Deficiency. Several Douglas-fir and white fir Christmas tree plantations near Sonoma were chlorotic. The symptoms were those of elemental or nutritional imbalance.

Damage from an unidentified cause. Curly needle symptoms were noted on Douglas-fir Christmas trees in Santa Clara, Santa Cruz, Sonoma and Napa Counties. The cause is unknown and still under investigation. The symptoms may be due to a mite or some abiotic, environmental factor.

Air pollution. Long-term ozone injury monitoring plots on the Sequoia National Forest (Fresno, Tulare, and Kern Counties) were evaluated for changes in the amount of foliar symptoms. Table 5 shows the percent change in the short-term (2 years) and long-term (17 years) for the 27 plots monitored. In general, foliar chlorotic mottle has gradually increased, especially on plots that are moderately or severely injured.

Table 5. Status of ozone injury on monitoring plots, Sequoia National Forest

	PERCENT CHANGE	
Status of Injury	Last 2 Years	Last 17 Years
MORE	55	82
NO CHANGE	15	18
LESS	30	0

FOLIAGE DISEASES

Foliage blight of Pacific madrone. In 1993, spring rains in northern California produced conditions conducive to an outbreak of a foliage blight of Pacific madrone. During the winter of 1993/1994 defoliation increased to 100 percent in some areas. Areas most severely affected were along the Klamath River corridor from the coast inland as far as Seiad. The Trinity River corridor from the confluence with the Klamath east to Junction City was also affected. The fungus most commonly observed on injured foliage was *Coccomyces arbutifolius*. The leaf spots caused by this fungus apparently coalesced with each other and with spots caused by other fungi, resulting in defoliation. The trees refoliated in the spring following bud break, but their crowns had a slightly thin appearance.

Sugar pine needle cast, caused by *Lophodermella arcuata*, was observed on western white pines along Scott Camp Creek near Castle Lake (Siskiyou County). This is at least the third consecutive year of this outbreak. Heavy rains late into the spring of 1993 likely contributed to an increased incidence of the disease. The injury was not as severe this year, but because of the

repeated defoliation many of the trees have only one year's complement of needles.

Over one hundred acres of sugar pines near Jacks Backbone (Shasta County) were also infected by needle cast. Several other reports of sugar pine needle cast were also received as follows: north of Bartle, Siskiyou Co.; near Dry Burney Creek, Shasta County; and in the Pinchard and Lost Creek drainages, Plumas County. Other unreported areas of needle cast are suspected.

Sycamore anthracnose. Defoliation and dieback due to sycamore anthracnose, caused by *Apiognomonia veneta*, was common on sycamores along a 6.5 mile stretch of the West Fork of the San Gabriel River on the Mt. Baldy Ranger District, Angeles National Forest, Los Angeles County.

Oak anthracnose, caused by *Apiognomonia errabunda* (*Discula umbrinella*) and other undescribed fungi, was quite reduced from last year in Mendocino and Lake Counties.

Bacterial Leaf Spot on Manzanita. A leaf spot of manzanita observed in a wholesale nursery in the foothills of Placer County was attributed to the bacteria, *Xanthamonas campestris*. This leafspot, which causes dark spots on both sides of the leaves and yellowing, was found only on the manzanita variety "Howard McMinn." The disease has only been found where plants are being irrigated; it has not been reported on manzanita growing in natural conditions.

Other foliage diseases. Specked leafspot on bigleaf maple, caused by *Rhytisma punctatum*, was noted in southern Humboldt County near Richardson's Grove.

A needle cast caused by *Cyclaneusma minus* infected Monterey pine near Little River in Mendocino County and hundreds of Monterey X knobcone hybrids above Orleans in Humboldt County.

An ornamental black pine in Fortuna had needle spotting and banding similar to both red band needle blight and brown spot needle blight. No identifiable fungi were isolated from the needles.

NURSERY DISEASES

Willow blight. Hundreds of willow cuttings growing at the Humboldt Nursery (Humboldt County) died back due to *Cytospora chrysosperma* infection. The cuttings showed black spots and experienced a rapid decline in June. Cytospora infections are often part of a complex of fungal infections, but no other fungi were identified from the cuttings. The cuttings resprouted and many recovered. They then became infected by willow rust (*Melampspora* sp.). The nursery treated with triadimefon and the plants recovered.

Phomopsis dieback. Red and white fir (2-0 stock) at Humboldt Nursery suffered a top dieback in May and June due to *Phomopsis occulta* (*Diaporthe conorum*). Infection was scattered with less than 5% of the stock affected.

Fusariums *Fusarium* sp. caused scattered dieback in 1-0 white and red fir at the Humboldt Nursery (Humboldt County). Some beds were below desired density due to a combination of Fusarium and insect feeding.

The Placerville Nursery (El Dorado County) successfully decreased losses and stunting due to Fusarium and other soilborne fungi by sowing these species earlier in the year. Beds were prepared in the Fall, covered with mulch for protection and planted in February. The sugar pine and red fir were able to grow large enough to withstand the root disease infection that usually hits when it gets hot in June and July.

Chico Genetic Resource Center Nursery (Butte County) also reported reduced levels of Fusarium on sugar pine and other species. The use of a new container washer may be responsible.

ROOT DISEASES

Infections by root pathogens often predispose conifers to attack by bark beetles. The association of root disease and bark beetles occurs throughout California forests and is a primary cause of tree mortality. Long-term loss of site productivity is one of the most serious consequences of these complexes.

Black stain root disease (caused by *Leptographium wageneri*) was again commonly reported in Douglas-fir in many areas of northern California, both in plantations and natural stands of mature trees. It was identified along a road on Scott River Ranger District, Klamath National Forest (Siskiyou County), next to the Deadwood progeny test site. This infection site is intermixed with significant levels of black stain root disease infection of ponderosa pine. A 1 to 2 acre black stain root disease center was identified in a stand of Douglas-fir, tanoak, and bigleaf maple in an old harvest unit on Lower Trinity Ranger District, Six Rivers National Forest (Humboldt County). Armillaria root disease (*Armillaria* sp.) was also present on the dead trees.

Black stain root disease was confirmed in both ponderosa pine and Douglas-fir at an elevation of 1300 ft. near the East Fork of the South Fork of the Trinity River, southeastern Trinity County. Approximately 20 acres of pine are affected. The disease was also confirmed in merchantable Douglas-fir near Moffett Creek, east of Fort Jones, Siskiyou County. On private forest land north of Butte Meadows, Tehama and Butte Counties, black stain root disease of pine continues to be a significant management problem over hundreds of acres.

Black stain root disease centers, in ponderosa and Jeffrey pine, continue to be discovered on the Modoc and Lassen National Forests (Modoc and Lassen Counties). These centers are more evident due to increased mortality caused by a combination of the black stain root disease and the continuing drought. Black stain appears to be present primarily on wetter sites in overstocked stands that were previously disturbed. It is also active in scattered Douglas-fir in Santa Cruz, San Mateo, Sonoma, and Lake Counties. The disease is causing extensive damage in Trinity, Humboldt and Mendocino Counties.

Annosus root disease caused by the fungus *Heterobasidion annosum*, was implicated in the failure of a 13 foot dbh giant sequoia near Round Meadow, Sequoia National Park, (Tulare County). The failed sequoia was located on the edge of a root disease center primarily affecting white fir. Viable conks of the pathogen were found in white fir stumps near the giant sequoia. The tree fell at mid-morning when winds were calm.

Annosus root disease was identified in many Jeffrey/ponderosa pine stands on the Lassen National Forest (Lassen County) west of Poison Lake, north and south of State Highway 44. The disease is causing mortality around stumps and creating openings in the stands.

Annosus root disease was found killing a few large madrones in the Willits watershed southeast of Willits. The dead and dying stems are within 20 feet of a large, decaying ponderosa pine stump. An annosus conk was also found on a redwood stump near Caspar in Mendocino County.

Armillaria root disease, caused by *Armillaria* sp., was found on grand fir at the mouth of the Navarro River in Mendocino County. These trees had been attacked by the fir engraver. In Lake County, the fungus also killed: a few Douglas-fir seedlings near Middletown; nearly 100 ponderosa pine seedlings, 10 manzanita and one sugar pine sapling all mixed with black oak above High Valley; and six Douglas-fir seedlings near a black oak in the vicinity of Loch Lomond. Also killed were two tanoaks and two Douglas-fir in Brooktrails and one Douglas-fir near Portola Heights.

Port-Orford-cedar root disease. The range of Port-Orford-cedar root disease (caused by *Phytophthora lateralis*) did not expand significantly in the past year and remains limited to extreme northwestern California. Seasonal closures are being increasingly employed in uninfested areas with Port-Orford-cedar to limit access and to lessen the risk of fungal spread.

The Upper Trinity, Klamath, and Sacramento watersheds remain free of Port-Orford-cedar root disease. GIS mapping of locations of Port-Orford-cedar and the disease continues. A Port-Orford-cedar Management Guide, to assist land managers in implementing an effective program, has been completed. With the retirement of the Port-Orford-cedar Program Manager, the Port-Orford-cedar Coordinating Group has been reorganized into two areas, a policy oversight team and a technical team. The policy oversight team, consisting of representatives of FPM in Regions 5 and 6, the Forest Supervisors, and BLM, is responsible for overall Program direction. The technical team functions as a source of technical expertise for the policy team.

Velvet top fungus. *Phaeolus schweinitzii*, the velvet top or cow-pie fungus, was found around declining Monterey pine within Pebble Beach Company property on the Monterey Peninsula. Elsewhere, the fungus was noted near dead and dying Douglas-fir near Loch Lomond, Jackson State Demonstration Forest and Pine Ridge in Mendocino County, and near Portola Heights. The fungus causes a brown cubical rot and can cause tree failure.

CANKER DISEASES

Pitch canker. Reports of *Fusarium subglutinans*, the fungus that causes pitch canker, in all three native Monterey stands and the discovery of the pathogen on Douglas-fir, are raising new concerns regarding the potential ecological impact of the disease. The Cambria stand, located in San Simeon State Park along the northern coast of San Luis Obispo County, is infected . Infections in Bishop pine in southern Mendocino County have also been reported. In coastal Santa Cruz County, ornamental plantings of Douglas-fir are infected but the disease has not spread into a neighboring native Douglas-fir stand. Pitch canker appears to be spreading in the urban areas of southern Santa Barbara County. It was also reported for the first time on the Los Padres National Forest in the Cerro Alto Campground, Santa Lucia Ranger District (San Luis Obispo County).

Disease resistance in Monterey pine has been identified and a plantation has been established in Santa Cruz County containing clones of trees presumed to be resistant. The California Department of Forestry and Fire Protection is no longer growing Monterey pine, Bishop and Monterey X knobcone seedlings for sale to the public and is recommending against the planting of Monterey pine until resistant stock is available.

Bacterial Canker. A mysterious canker became apparent in the early winter of 1994 on *Camptotheca acuminata* at the Chico Genetic Resource Center (Butte County). This canker led to stem dieback, sometimes to the ground line, of trees in both a production orchard and future arboretum. The cankers stopped at the ground line and did not affect the root system. Isolations from the cankers revealed several pathovars of *Pseudomonas syringae*, an ice nucleating bacteria. In November 1993 a severe cold spell occurred in the northern valley and may have interacted with these bacteria resulting in infection and canker development. By the late summer, most of the trees had recovered and sprouted, although they had suffered some loss of height.

Brush Dieback. A moderate level of brush dieback in *Ceanothus crassifolius* was reported at the San Dimas Experimental Forest and on the Santa Rosa Plateau near Murrieta and Temecula in Riverside County. This is the greatest amount of dieback at San Dimas since the initial serious outbreak there in 1984-1985. This decline is caused by a combination of drought stress and *Botryosphaeria dothidea* infection.

Other. *Botryosphaeria dothidea* (ribis) also caused top and branch mortality of several giant sequoia in Ukiah and one redwood in Brooktrails, Mendocino County.

DUTCH ELM DISEASE

In 1994, 86 trees from three counties were sampled for dutch elm disease (caused by *Ophiostoma ulmi*), and 36 were confirmed as positive by the California Department of Food and Agriculture laboratory in Sacramento (Table 6).

Table 6. Trees sampled for dutch elm disease.

County	Positive Samples	Negative Samples
Contra Costa	1	4
San Mateo	11	21
Sacramento	24	25
Totals	36	50

The reduction in samples from previous years is due to fewer people inspecting for the disease, not to an actual reduction in diseased trees.

BRANCH AND STEM DISEASES

Indian Paint Fungus. Conks of the Indian Paint fungus, *Echinodontium tinctorium*, were found on white fir trees in a Forest Service recreational summer-home tract on Lake Almanor (Lassen County). The hazardous trees were removed to protect the summer homes.

MISTLETOES

Dwarf mistletoes infest 2.2 million acres of national forest land or about 25% of the acreage in the Pacific Southwest Region. Dwarf mistletoes are widespread throughout California, but their distribution has not changed significantly in 1994. Their effects on trees however, are intensifying due to continued drought stress. This is especially true of white fir dwarf mistletoe, *Arceuthobium abietinum* f.sp. *concoloris*, which is commonly associated with branch flagging and tree mortality of white fir caused by the fir engraver beetle, *Scolytus ventralis*.

Branch mortality scattered within the crowns of red firs was conspicuous in the Big Meadow area, at an elevation of about 8000 feet, on the Cannell Meadow District, Sequoia National Forest, (Kern County). These red firs were moderately to severely infected with dwarf mistletoe. The assumption is that the Cytospora canker fungus (*Cytospora abietis*) killed branches infected with dwarf mistletoe. Tree mortality was light and typically about 20 to 40 percent of the red firs' crowns had been recently killed. White firs in the area were free of dwarf mistletoe and branch mortality.

Dwarf mistletoe, *Arceuthobium campylopodum*, occurs in ponderosa pine at scattered locations in Lake and Mendocino Counties. This year infestations were reported in High Valley, Loch Lomond and Lake Pillsbury in Lake County, and on Twin Rocks Ridge east of Covelo. Dwarf mistletoe infections can also be found in pockets on Monterey pine in Pebble Beach, Monterey County.

A dwarf mistletoe suppression project was conducted on the Milford Ranger District of the Plumas National Forest (Plumas County). Infected Jeffrey and ponderosa pine overstory trees were pruned or removed from 637 acres of pine plantations.

The Cottonwood Fire burned 47,000 acres on the Sierraville District of the Tahoe National Forest (Sierra County) and the Barkley Fire burned 44,000 acres on the Almanor Ranger District of the Lassen National Forest (Lassen County). Both these fires burned dwarf mistletoe infested pine stands within their perimeters. Dwarf mistletoe control ranged from total sanitation (complete fire kill of the pines) to light crown scorching, with little or no control.

Dwarf mistletoe continues to be a serious problem in Southern California recreation areas. Several suppression projects are underway. The Crystal Lake Recreation Area Project (Angeles National Forest, Mt. Baldy District) included removal of witches' brooms, branch pruning of 150 trees and 15 tree removals over a 30 acre site.

The Laguna Mountain Recreation Area Project at Burnt Rancheria, Wooded Hill, and Horse Heaven Campgrounds consisted of both limb and broom pruning and removals. Eighty acres were treated, 210 trees were pruned, and 33 trees removed in this Descanso District (Cleveland National Forest) project.

The Mt. Pinos Ranger District of the Los Padres National Forest pruned 275 trees infested with dwarf mistletoe and removed 75 trees over 175 acres on the Organizational Camps project.

The Ojai District, Los Padres National Forest, completed a Pre-Suppression Survey of the Pine Mountain Campground and surrounding areas, public scoping and a decision memo on the 60-acre recreation area, and conducted a 3-day tree climbing training.

The San Bernardino National Forest dwarf mistletoe suppression project in developed recreation areas continued forest-wide. In the 200-acre project, 410 trees were pruned and 119 trees were removed.

Oak mistletoe, caused by *Phoradendron villosum*, is causing dieback and decline in oaks in Liebre Mountain Area (Saugus Ranger District, Angeles National Forest).

RUST DISEASES

White Pine Blister Rust. In general, reported levels of blister rust (*Cronartium ribicola*) were very low on Ribes species throughout northern California because of dry conditions during the summer.

In the central Sierra, areas that have been repeatedly affected by white pine blister rust were visited in 1994 to assess rust activity during the past year. Seedling, sapling, and branch mortality were used as indicators of rust. Locations showing little or no 1994 rust activity included:

1. Rogers Camp, Tule River District, Sequoia NF, (Tulare County)
2. Shirley Meadow, Greenhorn District, Sequoia NF, (Kern County)
3. Cascade Creek, Summit District, Stanislaus NF, (Tuolumne County)

Locations showing continued rust activity in 1994 included:

1. Parker Meadow, Tule River District, Sequoia NF, (Tulare County)
2. Bacon Meadow, Hume Lake District, Sequoia NF, (Tulare County)
3. Panther Creek, Amador District, Eldorado NF, (El Dorado County)

White pine blister rust was reported on high elevation white bark pine near Thousand Lakes Wilderness (Shasta County). Several sapling to pole size trees showed branch infections. The infections occurred in a mature stand with white bark pine, mountain hemlock and red fir.

Rust-Resistant Sugar Pine Screening Program. Forty new sugar pine selections were identified with major gene resistance. The total number of rust resistant sugar pine samples is 655. In 1994, the Genetic Resources program launched a major effort to collect western white, white bark and foxtail pines for screening for resistance to white pine blister rust.

The program is also identifying sugar pine that are resistant due to slow rusting mechanisms. The objective is to obtain breeding populations of sugar pine that have two or more mechanisms of resistance, including major gene resistance. Multiple gene resistance should be more stable against white pine blister rust.

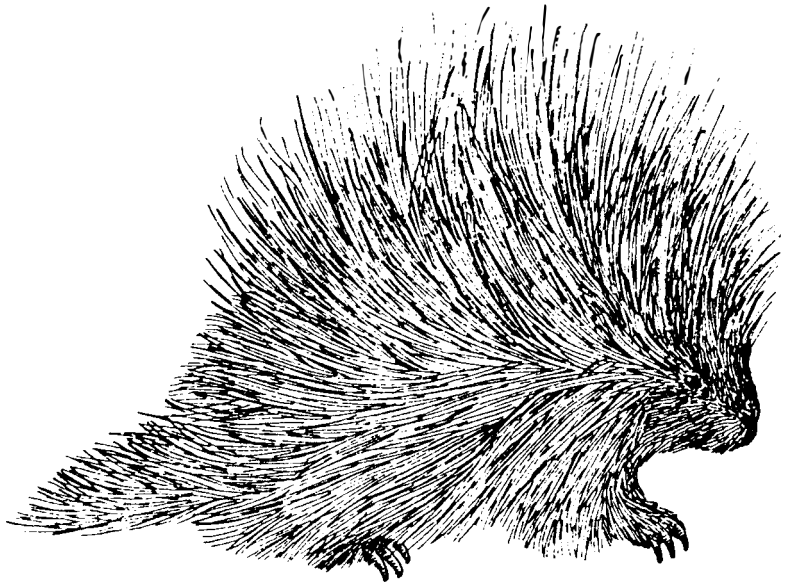
In 1994, the Genetic Resources program outplanted over 4,000 sugar pine seedlings with major gene resistance at the Happy Camp Outplanting Site (Siskiyou County). These seedlings are being monitored for slow rusting in cooperation with scientists from the Pacific Southwest Research Station. To date, three kinds of slow rusting resistance are recognized: low receptivity to infection, bark reaction, and shoot blight. Low receptivity to infection ranges from lower than average number of infections down to no infections. Bark reaction is

a walling off of the infection on a stem or branch that prevents its further spread. Growth of the cambium around the dead portion of the rust cankers results in a sunken area where the rust infection was. Presumably the rust has died out in the canker. In the shoot blight reaction the whole shoot distal to the infection and the infection site die and the infection does not spread from the shoot to the main stem.

Western Gall Rust. *Endocronartium harknessii*, the fungus that causes western gall rust, severely infected nearly two hundred Monterey pine saplings in a Fort Bragg plantation, dozens of Bishop pine seedlings and saplings near Gualala in Mendocino County, and infected dozens of Monterey X knobcone saplings and poles above Orleans, Humboldt County. Many of the infections were near the groundline on small trees.

STATUS AND CONTROL OF ANIMAL PESTS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE ANIMAL DAMAGE COMMITTEE



PREPARED BY : JOHN BORRRECCO

STATUS AND CONTROL OF ANIMAL PESTS

INTRODUCTION

This report summarizes the Animal Damage Committee's annual survey of vertebrate damage to forest trees. The survey is accomplished by mailing a simple form to private timber companies, federal and state agencies, and other organizations who manage forested lands in California. The survey form requests summary information by pest species regarding species of trees injured, age class of trees, acres over which damage occurs, number of trees per acre damaged, whether damage occurs in plantations or other areas, the general trend in damage relative to past conditions, and control methods used. Results of this survey are reported as part of the California Forest Pest Council's annual overview of forest pest conditions in California.

In September, 1994, 82 survey forms were mailed to federal and state agencies, private timber companies, and other private organizations managing forested lands in California. A total of 39 (48% return) responses were received.

RESPONDENTS AND LOCATION OF REPORTS

Survey forms were returned by representatives of the U.S. Forest Service (n= 17); California Department of Forestry and Fire Protection (n=7); private timber companies (n=9); and various other organizations (n=6) including the National Park Service (3) and the Bureau of Land Management (2).

Incidence of damage to trees was reported from 31counties representing over 1/2 of the land area of California. Counties represented: Alpine, Amador, Butte, Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kern, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, Santa Cruz, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne, and Ventura.

SPECIES CAUSING DAMAGE

A variety of mammal species are causing damage to forest trees and the damage varies by region of the state and by land ownership (Table 7). Species most commonly identified in this survey (as well as in previous

Table 7. Number of damage responses reported by vertebrate species in 1994(N=39).

Species	USFS	CDF	Private	Other	Total
Beaver	2	0	0	0	2
Birds	0	1	0	1	2
Black Bear	2	2	2	0	6
Deer	13	3	4	1	21
Wood Rat	3	2	2	0	7
Elk	1	0	1	0	2
Meadow mice	0	1	0	0	1
Mountain Beaver	1	0	1	0	2
Pocket gopher	15	0	4	0	19
Porcupine	10	0	0	0	10
Rabbits and hares	11	2	2	0	15
Tree squirrels	1	1	1	1	4
Domestic stock	12	0	1	2	15
Feral Pigs	0	0	0	1	1
Gound spuirrels	2	0	1	0	3
Total	73	12	19	6	110
(n)	(17)	(7)	(9)	(6)	(39)

years) as causing problems are deer (53% of respondents), pocket gopher (49%), domestic stock (38%), rabbits and hares (38%), porcupine (26%), woodrat (18%) and black bear (15%). While deer feeding injuries continue to be the most frequently reported activity, browsing damage in 1994 was more limited to the northern and central Sierra Nevada counties. Pocket gophers, rabbit and hares, and livestock feeding injuries on trees occur throughout the State. Damage by other species tends to be more limited geographically.

SCOPE OF DAMAGE

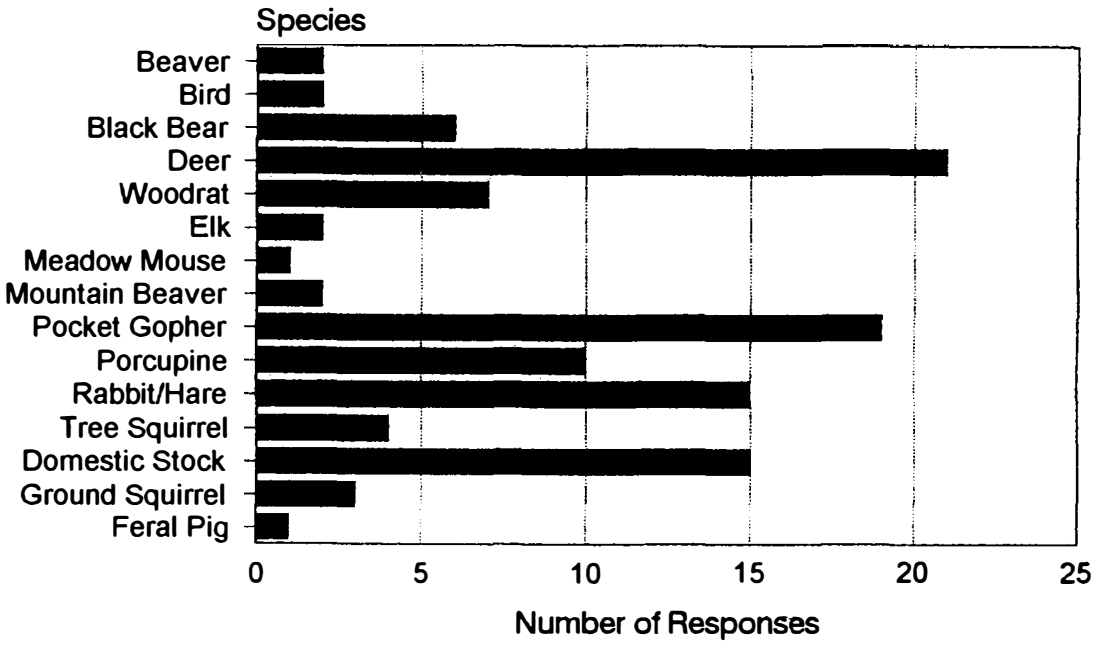
Damage from all sources was reported on about 165,683 acres (Table 8). All of California's major timber producing regions and timber types have reported damage by vertebrate species. Based on the acres of damage, the species ranking changes only slightly: deer (31% of the acres), black bear (26%), pocket gopher (15%), domestic stock (15%), porcupine (4%), woodrat (4%), elk (3%), and all others (2%).

Table 8. Number of acres reported to be actively receiving some level of damage in 1994.

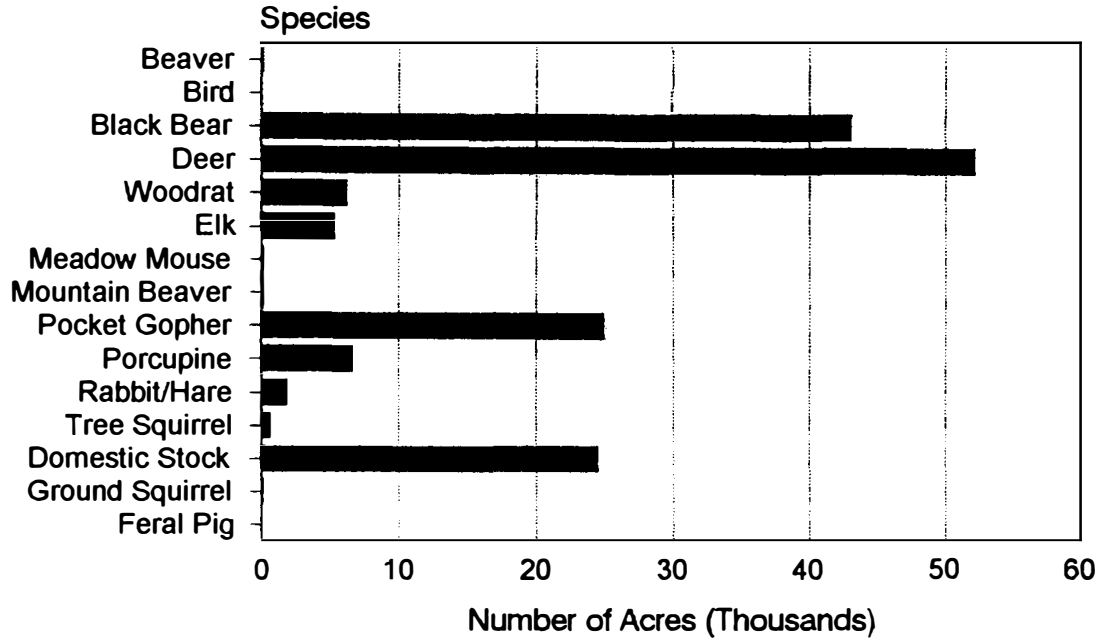
Species	USFS	CDF	Private	Other	Total
Beaver	80	0	0	0	80
Birds	0	*	0	*	0
Black Bear	565	12	42,500	0	43,065
Deer	46,256	12	5,669	200	52,137
Wood Rat	898	300	5,000	0	6,198
Elk	350	0	5,000	0	5,350
Meadow mice	0	100	0	0	100
Mountain Beaver	53	0	60	0	113
Pocket gopher	24,316	0	620	0	24,936
Porcupine	6,637	0	0	0	6,637
Rabbits and hares	1,546	12	250	0	1,808
Tree squirrels	500	*	*	100	600
Domestic stock	24,247	0	*	300	24,547
Feral Pigs	0	0	0	*	*
Gound spuirrels	72	0	40	0	112
Total	105,520	424	59,139	600	165,683

* Incidence of damage reported but no information as to how many acres were affected.

Species Causing Damage



Acres Damaged



SPECIES ACCOUNTS

BEAVER

Species Damaged: Aspen and various conifers.
Damage Trend: Static.
Control Methods: None (2/2).
Damage Location: Nevada, Placer, Plumas, and Sierra Counties.
Comments: Damage reported to poles sized trees (20 to 80 years) and to some 3 to 4 year-old aspen in streamside zones.

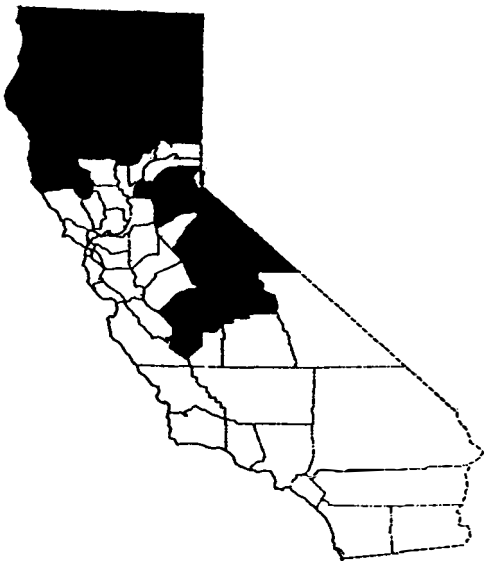
BIRDS

Species Damaged: Ornamental Monterey pine, and oaks.
Damage Trend: Static.
Control Methods: None (2/2).
Damage Location: Mendocino and San Benito Counties.
Comments: Sapsucker injuries to ornamental conifers on the north coast contine to be reported. Introduced wild turkeys are consuming acorns of native oaks and rooting up oak seedlings in the Pinnales National Monument.

BEAR

Species Damaged: Douglas-fir, redwood, grand fir, white fir, Port Orford cedar, and Sitka spruce.
Damage Trend: Increasing.
Control Methods: Sport hunting (2/6), none (4/6).
Damage Location: Del Norte, Humboldt, and Fresno Counties.
Comments: Damage was reported in both plantations and natural stands to poles and small saw timber from 10 to 90 years old. Levels of damage vary from 1 to 60 trees/acre. Black bears are primarily a problem on private timber lands on the north coast of California, however a few incidences of bear damage were reported on the Sequoia National Forest near Burton Pass in Fresno County.

DEER



Species Damaged: Douglas-fir, redwood, ponderosa pine, Jeffrey pine, sugar pine, lodgepole pine, western white pine, white fir, red fir, incense cedar, Port Orford cedar, and black oak.
Damage Trend: Static.
Control Methods: Seedling protectors (12/21), repellents (4/21), hunting (1/21) and none (8/21).
Damage Location: Alpine, Amador, Butte, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Placer, Plumas, Shasta, Siskiyou, Tehama, Trinity, and Tuolumne Counties.
Comments: Most damage occurs to seedlings 1 to 10 years old in plantations. Levels of damage reported varied from 10 to 350 trees/acre. Seedling protectors include plastic mesh tubes and plastic mesh netting. Repellents include BGR and Plant Pro-Tec (garlic units).

WOODRAT

Species Damaged: Douglas-fir, redwood, white fir, red fir, ponderosa pine, and sugar pine.
Damage Trend: Static.
Control Methods: Seedling protectors (1/7) and none (6/7).
Damage Location: Calavaras, Del Norte, Humboldt, Lake, Mendocino, Siskiyou, and Trinity Counties.
Comments: Damage occurred to trees 1 to 80 years old at levels of 1 to 300 trees/acre in plantations. Woodrat damage is primarily reported from forests on the north coast of California.

ELK

Species Damaged: Douglas-fir, redwood, white fir, ponderosa pine, and incense cedar.
Damage Trend: Static.
Control Methods: None (2/2).
Damage Location: Humboldt and Siskiyou Counties.
Comments: Damage occurs to seedlings and saplings 1 to 5 years of age at levels of 20 to 300 trees/acre.

MEADOW MOUSE

Species Damaged: Coulter and ponderosa pine.
Damage Trend: Static
Control Methods: None (1/1).
Damage Location: Mendocino County.
Comments: Scattered girdling damage occurring on about 5 thousand 2 to 5 year-old seedlings in dense annual grass and thistle habitat in a plantation near Philo.

MOUNTAIN BEAVER

Species Damaged: Douglas-fir and redwood
Damage Trend: Static to increasing..
Control Methods: None (2/2).
Damage Location: Del Norte, Humboldt.
Comments: Damage occurs in plantations to seedlings 2 to 10 years old at levels of about 2 to 200 trees/acre.

POCKET GOPHER

Species Damaged: Douglas-fir, white fir, red fir, ponderosa pine, Jeffrey pine, Coulter pine, sugar pine, lodgepole pine, western white pine, giant sequoia, incense cedar,
Damage Trend: Static to increasing.
Control Methods: Strychnine bait (10/19), trapping (3/19), none (8/19).
Damage Location: Alpine, Amador, Butte, Calaveras, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kern, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Neveda, Placer, Plumas, Riverside, San Bernardino, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, and Tuolumne Counties.
Comments: Most damage to seedlings occurs in plantations 1 to 10 years old. Levels of damage reported range from 1 to 500 trees/acre.

PORCUPINES

Species Damaged: White fir, ponderosa pine, and Jeffrey pine.
Damage Trend: Static.
Control Methods: None (10/10).
Damage Location: Alpine, Butte, Calaveras, El Dorado, Lassen, Modoc, Mono, Nevada, Placer, Plumas, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tuolumne, and Tulare Counties.
Comments: Injuries occur to seedlings through mature trees in plantations and natural stands at levels of damage ranging from 1 to 200 trees/acre.

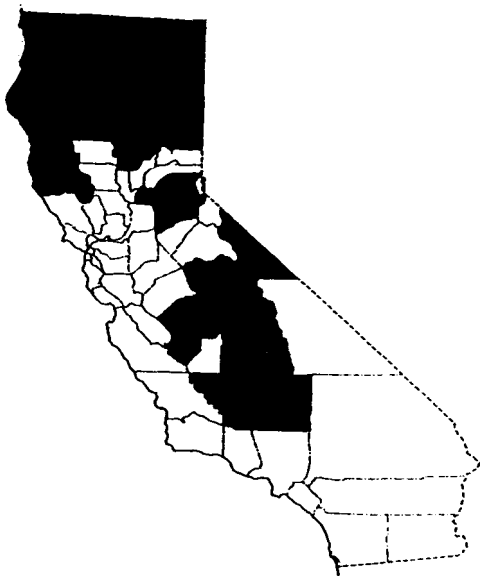
RABBIT & HARE

Species Damaged: Douglas-fir, big cone Douglas-fir, white fir, red fir, Coulter pine, ponderosa pine, Jeffrey pine, lodgepole pine, western white pine, and giant sequoia.
Damage Trend: Static.
Control Methods: Seedling protectors (5/15), vegetation control (1/15), and none (9/15).
Damage Location: Butte, Del Norte, El Dorado, Humboldt, Fresno, Lake, Lassen, Mendocino, Modoc, Mono, Plumas, San Bernardino, Shasta, Siskiyou, Riverside, Tehama, Trinity, Tulare, and Ventura Counties.
Comments: Damage reported to seedlings 1 to 10 years old in plantations at levels of 1 to 400 trees/acre.

TREE SQUIRREL

Species Damaged: Douglas-fir, redwood, ponderosa pine, sugar pine, and giant sequoia.
Damage Trend: Static.
Control Methods: Metal bands (1/4), none (3/4).
Damage Location: El Dorado, Mendocino, and Siskiyou Counties.
Comments: Most reports concerned bark stripping and top kill, especially of redwood saplings to second growth saw timber (80 years). Damage to rust resistant sugar pine seeds and cones was also reported.

DOMESTIC STOCK



Species Damaged: Douglas-fir, white fir, red fir, ponderosa pine, Jeffrey pine, lodgepole pine, sugar pine, western white pine, giant sequoia, incense cedar, black oak, and aspen.
Damage Trend: Static.
Control Methods: Placement of salt (1/15), seedling protectors (2/15), grazing restrictions (1/15), fences (1/14), none (11/15).
Damage Location: Amador, Butte, Del Norte, El Dorado, Fresno, Humboldt, Kern, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Placer, Plumas, Shasta, Siskiyou, Tehama, Trinity, and Tulare Counties.
Comments: Most respondents reported damage to seedlings and saplings 1 to 5 years old in plantations. Levels of damage varied from 1 to 200 trees/acre. Some reported damage to aspen suckers and oak woodlands. One respondent reported both sheep and cows causing injuries and indicated that cows primarily cause injury by trampling and laying on seedlings.

GROUND SQUIRREL

Species Damaged: Coulter pine, ponderosa pine, Jeffrey pine, giant sequoia, and big cone Douglas-fir.
Damage Trend: Static.
Control Methods: Seedling protectors (1/3), repellent (1/3), none (1/3).
Damage Location: Fresno, Madera, Mariposa, San Bernardino, and Riverside Counties.
Comments: Damage is occuring to seedlings 1 to 5 years old in plantations at levels of 5 to 300 seedlings/acre.

FERAL PIG

Species Damaged: Oak species.
Damage Trend: Static.
Control Methods: Direct reduction of pigs (1/1).
Damage Location: San Benito County. (Pinnacles National Monument).
Comments: Consumption of mast and physical distruction of seedlings from rooting activity.

STATUS AND CONTROL OF WEEDS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE WEED COMMITTEE

FLEMING BADENFORT, CHAIR

KEN FLEMING, SECRETARY

(Information not available at time of printing)

SURVEYS AND EVALUATIONS

A REPORT TO THE CALIFORNIA FOREST PEST COUNCIL FROM THE INSECT AND DISEASE COMMITTEES

SURVEYS AND EVALUATIONS

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST.

In 1978-1979 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density -- 40, 55, 70, and 100 percent of normal basal area -- were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have reached when fully stocked with trees, from 185 to 215 sq ft/ac in the demonstration areas, depending on site quality.) Fourteen years after thinning the treatments have reduced mortality from 90 to 100 percent of the level in unthinned stands (Table 9).

Table 9. Commercial tree mortality by stocking level, fifteen years after thinning[a]

Year	Residual Stocking After Thinning[b] 40%	55%	70%	100%
	Mortality Trees per Acre			
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
1991	0.0	0.0	0.0	1.8
1992	0.0	0.2	0.0	3.0
1993	0.0	0.2	0.3	5.2
1994	0.0	0.0	0.0	4.8
Mean	0.0	0.1	0.2	2.5
Range	0	0-0.5	0-0.8	0.0-5.2
Percent Mortality Reduction Compared with Normal Basal Area				
	100	96.0	92.0	

a. Commercial trees are 8 inches dbh and larger, with straight boles, yielding at least one 10-foot log with a 6-inch top. Trees were killed by the mountain pine beetle.

b. Percent of normal basal area.

AIR POLLUTION

To determine the extent and location of ozone damage of Jeffrey and ponderosa pine on the Los Padres National Forest, twenty plots with over 100 trees were surveyed throughout the forest. The most severe damage was found in the Tecuya Mountains on the Mt. Pinos Ranger District which is located adjacent to the San Joaquin Basin. The least damage was found adjacent to the Pacific Coast on the Monterey Ranger District. With the assistance of Pacific Southwest Station at Riverside, the Los Padres National Forest plans to install permanent plots to monitor ozone damage.

Forest Ozone Response Study. A new standardized method for describing chronic injury by ozone to the crowns of ponderosa and Jeffrey pines is being field tested by a cooperative project entitled the Forest Ozone Response Study (FOREST). Cooperators include Region 5, Air Resource Management and Forest Pest Management, staff from 10 National Forests and three National Parks, the Pacific Southwest Research Station, and the California Air Resources Board. FOREST plots are located from Lassen National Park in the North to the San Bernardino National Forest in the South.

Four variables are measured on each of 50 trees/plot, assigned weights and used to calculate an ozone injury index. The variables include needle whorl retention (40%), chlorotic mottle intensity on each whorl (40%), needle length of each whorl (10%), and live crown ratio (10%). The index ranges from 0 (no injury) to 100 (maximum injury). The northern Sierra plots have average index values as low as 2 to 3 whereas southern Sierra and San Bernardino plots have index values as high as 41. Thus there is a demonstrable increase in ozone damage from north to south in California. Data has been gathered from the same trees annually since 1991. Between 1991 and 1993 injury has generally remained the same.

Results for 1994 are available only for the San Bernardino National Forest. Between 1991 and 1994 there was a significant increase of injury index on 3 plots at Barton Flats (23.6 to 31.3). Across a 12 mile-long, west-to-east downwind transect in the San Bernardino mountains (higher to lower ozone concentrations), a substantial difference in injury index is detectable at pine plots. For example, injury index values were 37.3

(mile 1, Angelus Oaks), 31.3 (mile 6, Barton Flats), and 15.7 (mile 12, Heart Bar).

Between 1971 and 1994 at Charlton Flat in the Angeles National Forest, there were signs of improved tree condition based only on the number of annual needle whorls on branches of the lower crown--not the index value. The plot originally contained fifty trees. Fifty five percent of 34 remaining trees had one or more additional annual whorls, 41 percent had the same number, and 3 percent had at least one less whorl. The Angeles National Forest established two additional 50-tree monitoring plots and obtained the initial data set needed to calculate the ozone injury index.

Nitrogen deposition. On the San Bernardino National Forest, Paul Miller, PSW-Riverside, is measuring nitrogen deposition from the atmosphere at Barton Flats and other sites across the forest. Data indicates that the most westerly forest sites in the San Bernardino Mountains may be approaching saturation with nitrogen. The following observations have been noted for the western one-third of the San Bernardino National Forest where nitrogen deposition rates are the highest:

1. Total nitrogen concentrations in soil, foliage and litter are much higher than in low pollution, forested sites in the San Bernardino Mountains.
2. Soils have a high nitrogen to phosphorus ratio.
3. There is a high concentration of nitrate (NO3) in foliage of bracken fern and in several tree species.
4. Soil pH is low. Soil pH levels have been decreasing since 1975.
5. Elevated levels of nitrate are sustained throughout the growing season.
6. There are higher than expected nitric oxide emissions from the soil.

A likely consequence of the persistently high nitrate concentrations in soil is abnormally high losses of nitrates from the forest in the form of soil leachate resulting in higher nitrate concentrations in the water. Air pollution may be reducing the quality of local water in these watersheds which are highly exposed to incoming air pollution.

BLACK STAIN ROOT DISEASE

In Douglas-fir Plantations. During 1994, Happy Camp Ranger District, Klamath National Forest, continued their survey for black stain root disease in Douglas-fir plantations. In 1993 all traversable roads and trails that bordered or ran through plantations with Douglas-fir were surveyed. From this list of plantations a subsample of infested plantations was intensively sampled in 1994 to obtain information on incidence of the disease within a plantation. A total of 30 plantations with over 700 acres were surveyed. The data are currently being analyzed.

Orleans Ranger District, Six Rivers NF surveyed a total of 15,500 acres of Douglas-fir plantations for black stain incidence and impact. 117 plantations were checked from the roadside and 2,775 acres (18% of the area surveyed) were estimated to be infected. The district also did an intensive black stain survey in 20 plantations on 433 acres. Black stain was identified in 15 of the plantations, but damage level due to the black stain was low.

In Northeastern California. As part of a study to determine site factors associated with the incidence of black stain root disease of pine, a paired plot survey of known black stain centers on the Modoc and Lassen National Forests was conducted during 1994. Not surprisingly, black stain was associated with wet sites, overstocking and site disturbance. There was a strong correlation between black stain incidence and the plant associations for the eastside pine type. Indicator plants of wet sites, including rose, serviceberry, and several species of Prunus, were typical of black stain centers.

OTHER

Log Importation. The final environmental impact statement (EIS) on the "Importation of Logs, Lumber, and Other Unmanufactured Wood Articles" was released in July 1994. The EIS was prepared by the Animal and Plant Health Inspection Service (APHIS). The preferred alternative, based on the results of pest risk assessments for the importation of logs from Siberia, Chile, and New Zealand and after receiving public comment on the advance notice of proposed rulemaking, contains technical modifications to proposed regulations (59 FR 3002-3029, January 20, 1994). In brief, the proposed regulations would impose three basic requirements for the entry of regulated articles into the U.S.:

1. A permit issued by APHIS. Conditions required in the permits may involve physical (debarking, heat treatment) and chemical treatments (with chemicals registered by the EPA) to ensure that plant pests are not inadvertently introduced into the U.S.
2. An importer document or certificate verifying that the conditions of the APHIS regulations have been met.
3. Inspection of all regulated articles at the time of arrival.

Change Detection. A pilot project is underway to evaluate change detection techniques for assessing conifer mortality on the Lake Tahoe Basin Management Unit (LTBMU). Remote sensing and geographic information systems (GIS) are being used to determine vegetation changes that occurred from 1991-1994. The vegetation change detected relates to mortality of conifers largely due to bark beetle infestations. Previous activities employing similar techniques yielded reliable results, approximately 70% accuracy from a 1992 study assessing conifer mortality. Plans for FY-95 include a cooperative project with California Department of Forestry, Forest Pest Management group and USDA-Forest Service, State and Private Forestry, Forest Pest Management to implement change detection of conifer and hardwood mortality over a large area (500,000 acres) covering multiple ownerships and varying vegetation types.

THE CALIFORNIA TREE FAILURE REPORT PROGRAM

The California Tree Failure Report Program was established in 1987 to collect quantitative information about urban tree failures. This information is used to develop "failure profiles" for genera and species to more accurately assess failure probability in standing trees. Over100 tree-care professionals are cooperating in this effort by systematically inspecting fallen trees, or tree parts, and reporting results for entry into a database program. If you would like to participate in this program contact the California Tree Failure Report Program, Department of Environmental Horticulture, University of California, Davis, CA 95616.

The 186 records for Monterey pine were compiled into a failure profile that characterizes the failure location, structural defects, decay, climatic conditions and other factors associated with structural failure of Monterey pine. Sixty percent of the reported failures were limb failures, rather than trunk or root failures and most of these were considered to be heavy lateral limbs -- a structural defect. The majority of limb breakage occurred away from, rather that at the point of attachment, suggesting a wood strength problem. Decay was not frequently associated with Monterey pine failures at any location on the tree. Tree spacing, nutrition and genetic strain are likely to be major factors influencing heavy lateral limb development. Closer tree spacing, low nitrogen input and genetic selection offer hope for reducing Monterey pine branch failure.

TREE DIAGNOSES, CALIFORNIA DEPT. FOOD AND AGRICULTURE.

The California Department of Food and Agriculture is often asked to identify the cause of injury or disease on various species of trees. The 1994 diagnoses are given in Table 10.

Table 10. Injury And Disease Diagnoses From Trees Made By The California Department of Food and Agriculture - 1994 Laboratory Samples

Host Tree	Diagnosis	County
Abies concolor	*Lasiodiplodia theobrome* *Macrophomina phaseolini*	El Dorado
Abies concolor	*Lasiodiplodia theobrome*	El Dorado
Acer macrophylum	*Rhytisma punctatum*	Santa Clara
Acer *palmatum*	*Verticillium dahliae*	San Mateo
Acer palmatum	*Armillaria mellea*	Sacramento
Acer saccharinum	*Armillaria mellea*	Sacramento
Celtis *occidentalis*	*Phytophthora* sp.	Tehama
Cinnamomum camphora	*Armillaria mellea*	Sacramento
Cornus sp.	Phomopsis sp.	Butte
Cupressocyparis leylandii	*Seridium cardinale*	San Joaquin
Cupressus *sempervirens*	*Seridium cardinale*	Humboldt
Eriobotrya japonica	*Entomosporium mespili*	Fresno
Fraxinus *nigra*	*Discula fraxinea*	San Mateo, Solano
Juglans sp.	*Microstroma juglandis*	Santa Clara
Juniperus sabina tamariscifolia	*Dothiorella* sp. and girdling	Lake
Liquidamber sp.	Physiological, drought stres	Shasta
Liquidamber sp.	Sunburn and drought stress	Sonoma
Liriodendron tulipifera	Physiological, drought stress	Santa Cruz
Liriodendron sp.	Chemical injury	Colusa
Malus sp.	Rhizoctonia sp.	El Dorado
Malus sylvestris	Mite feeding damage	Alameda
Malus sylvestris	*Venturia inaequalis* (Apple scab)	San Bernardino, San Mateo, and Tulare
Malus sylvestris	Irrigation problems	Yolo
Malus sylvestris	Apple mosaic virus	San Joaquin

Table 10. Injury And Disease Diagnoses From Trees Made By The California Department of Food and Agriculture - 1994 Laboratory Samples (continued)

Host Tree	Diagnosis	County
Malus sylvestris	*Gymnosporangium juniperi-virginianae*	Nevada
Malus sylvestris	Excess irrigation	Sacramento
Malus sylvestris	Wooly aphid gall	Santa Clara
Malus sylvestris	*Crytosporiopsis* sp. (Perennial canker)	Santa Clara
Malus sylvestris	*Erwinia amylovora* (Fireblight)	Sacramento
Mimosa sp.	*Coniothyrium*	Placer
Mimosa sp.	Gophers girdling base of tree	Colusa
Olea europaea	Olive knot	Sacramento, Santa Barbara
Olea europaea	Rodent damage	Tehama
Pinus radiata	*Fusarium subglutinans* (Pitch canker)	Monterey
Pinus radiata	*Pestalotiopsis* sp.	San Francisco
Pinus sp.	Spider mite feeding	Ventura
Platanus occidentalis	Growth hormone herbicide	Butte
Plantanus sp.	*Discula platani* (Anthracnose)	Colusa, Shasta, Tuolumne
Prunus avicum	Genetic aberration	Merced
Prunus avicum	Phloeosporella padi (Cherry leaf spot)	Humboldt
Prunus persica	Powdery mildew	Placer
Prunus persica	Nutrient deficiency	Sutter
Prunus persica	*Armillaria mellea*	Humboldt
Prunus persica	Powdery mildew	Sacramento
Prunus armeniaca	*Monilinia* sp. (Brown Rot)	Sacramento

Table 10. Injury And Disease Diagnoses From Trees Made By The California Department of Food and Agriculture - 1994 Laboratory Samples (continued)

Host Tree	Diagnosis	County
Prunus dulcis	*Kabatiella prunicola*	Placer Stanislaus
Prunus dulcis	Herbicide drift	Butte
Prunus sp.	*Transzchelia discolor*	Mendocino
Pseudotsuga menziesii	*Ceratocystis* sp	El Dorado
Pseudotsuga menziesii	Heat burn	Santa Clara
Quercus lobata	Powdery mildew	Santa Clara
Quercus sp.	Armillaria mellea	Sacramento
Quercus sp.	Powdery mildew	San Mateo
Rhamnus ilicifolia	*Puccinia mesieriana*	San Diego
Robinia *ambigua*	Powdery mildew	San Diego
Rubus sp.	*Coniothyrium* sp.	El Dorado
Salix niobe	Botryosphaeria canker	Humboldt
Salix sp.	*Melampsora* sp. (Rust)	Colusa
Sequoia sp.	Excess water & poor drainage	Shasta
Sequoia sp.	Sunburn	Sacramento
Sequoiadendron gigantium	Botryosphaeria canker	Sacramento
Ulmus crassifolia	*Ophiostoma ulmi* (Dutch elm disease)	Sacramento
Ulmus paevis	*Ophiostoma ulmi*	San Mateo
Ulmus parvifolia	*Ophiostoma ulmi*	Contra Costa
U*lmus procera*	*Ophiostoma ulmi*	Sacramento
Ulmus sp.	*Ophiostoma ulmi*	Sacramento, San Mateo
Ulmus sp.	*Gloeosporium* (Anthracnose)	Contra Costa

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UNITED STATES DEPARTMENT OF AGRICULTURE - FOREST SERVICE — CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See Instructions on reverse)

1. COUNTY:	2. FOREST (FS ONLY):	3. DISTRICT (FS ONLY):

4. LEGAL DESCRIPTION:	6. LOCATION:	7. LAND OWNERSHIP:
T._____ R._____		1. FOREST SERVICE ☐
S._____		2. OTHER FEDERAL ☐
5. DATE:		3. STATE ☐
		4. PRIVATE ☐

8. SUSPECTED CAUSE(S) OF INJURY:				9. SIZE(S) OF TREE(S) AFFECTED:				10. PART(S) OF TREE(S) AFFECTED:			
1. INSECT	☐	5. CHEMICAL	☐	1. SEEDLING	☐	4. SAWTIMBER	☐	1. ROOT	☐	5. TWIG	☐
2. DISEASE	☐	6. MECHANICAL	☐	2. SAPLING	☐			2. BRANCH	☐	6. FOLIAGE	☐
3. ANIMAL	☐	7. WEED	☐	3. POLE	☐	5. OVERMATURE	☐	3. LEADER	☐	7. BUD	☐
4. WEATHER	☐	8. UNKNOWN	☐					4. BOLE	☐	8. CONE	☐

11. SPECIES AFFECTED:	12. NUMBER AFFECTED:	13. ACRES AFFECTED:

14. INJURY DISTRIBUTION:			15. STATUS OF INJURY:				
1. SCATTERED	☐	2. GROUPED ☐	1. DECREASING	☐	2. STATIC ☐	3. INCREASING	☐

16. PLANTATION ?	17. STAND COMPOSITION (SPECIES):	18. STAND AGE AND SIZE CLASS:
1. YES ☐		
2. NO ☐	19. STAND DENSITY (BASAL AREA):	20. SITE QUALITY:

21. PEST NAMES (IF KNOWN), AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS):

22. SAMPLE FORWARDED ?	23. ACTION REQUESTED:	24. REPORTER'S NAME:	25. REPORTER'S AGENCY:
1. YES ☐	1. YOUR INFORMATION ONLY ☐		
2. NO ☐	2. LAB IDENTIFICATION ☐	26. REPORTER'S ADDRESS, ZIP CODE, & PHONE NO.:	
	3. FIELD EVALUATION ☐		

II. REPLY (Pest Management Use)

27. RESPONSE:

31. FILE NO.

28. REPORT NUMBER:	29. DATE:	30. EXAMINER'S SIGNATURE:

R5-3400-1 (Rev. 2/82)

THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Control Action Council. The Pest Action Council encourages Federal, State, and private land managers and individuals to contribute to the Survey by submitting pest injury reports and samples in the following manner.

FEDERAL PERSONNEL. Send all detection reports through channels, and mail injury samples with a copy of this report to:

USDA, FOREST SERVICE, Forest Pest Management
630 Sansome Street, San Francisco, Ca. 94111.

STATE PERSONNEL. Send all detection reports through channels, and mail injury samples with a copy of this report to:

CALIFORNIA DEPARTMENT OF FORESTRY
1416-9th Street, Sacramento, Ca. 95814.

PRIVATE LAND MANAGERS AND INDIVIDUALS. Send all detection reports and samples to:

CALIFORNIA DEPARTMENT OF FORESTRY
1416-9th Street, Sacramento, Ca. 95814.

COMPLETING THE DETECTION REPORT FORM.

HEADING (BLOCKS 1-7). Enter all information requested. In Block 6, LOCATION, note distinguishing landmarks and place names so that the injury center can be relocated. If possible, attach a location map to this form.

INJURY DESCRIPTION (BLOCKS 8-15). Check as many boxes as are applicable, and fill in the requested information as completely as possible.

STAND DESCRIPTION (BLOCKS 16-20). This information will aid the examiner in determining how the stand conditions contributed to the pest problem. In Block 17, indicate the major tree species in the overstory and understory. In Block 18, indicate the stand age in years, and/or the size class (seedling-sapling; pole; young sawtimber; mature sawtimber; overmature, or decadent).

PEST NAMES (BLOCK 21). Write a detailed description of the pest or pests, the injury symptoms, and any contributing factors.

ACTION REQUESTED (BLOCK 23). Mark "Field Evaluation" only if you consider the injury serious enough to warrant a professional evaluation. Mark "Your Information Only" if you are reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the lower part of this form.

REPLY (SECTION II). Make no entries in this block; for examining personnel only. A copy of this report will be returned to you with the information requested.

HANDLING SAMPLES.

Please submit injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a screw-top mailing tube or other sturdy container, and enclose a completed copy of the detection report.

YOUR PARTICIPATION IN THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED. Additional copies of this form are available from the Forest Service, Forest Pest Management, and from the California Department of Forestry.

CALIFORNIA FOREST PEST COUNCIL

COUNCIL AND COMMITTEE OFFICERS - 1994

COUNCIL CHAIR: Scott Johnson - Wilbur-Ellis Co. - Manteca
COUNCIL VICE-CHAIR: Nelsen Money - Pacific Gas & Electric - Grass Valley
COUNCIL SECRETARY: Susan Frankel - USDA Forest Service - San Francisco

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Chair: None
Secretary: None

Disease Committee:
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Secretary: John Pronos - USDA Forest Service - Sonora

Insect Committee:
Chair: Bruce Roettgering - Sunnyvale
Secretary: Laura Merrill - USDA Forest Service - San Bernardino

Southern California Committee:
Chair: Mike Wilkinson - L.A. County Fire Department - Los Angeles
Secretary: Ken Pimlott - CDF - Riverside

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Secretary: Ken Fleming - Fiberboard - Standard

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Chair: Steve Jones - CDF - Sacramento
Editor-in-Chief: Allen Robertson - CDF - Sacramento

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The Executive Committee is composed of the Council Chair, Vice-Chair, Council Secretary, the Standing Committee Chairs, and the following Members-at-Large:

Jere Melo - Georgia Pacific Corp. - Fort Bragg
George Ferrell - USDA Forest Service, PSW Experiment Station - Redding
Andrew Storer - University of California -Berkeley